Embedded Solutions

BC50M - Box Computer for Mobile Applications / AMD

- **Compliant to EN 50155 (railways)**
- **Prepared for e1 (automotive)**
- **AMD Embedded G-Series APU**
- **2 DisplayPorts, up to 2560x1600 each**
- **2 Gigabit Ethernet, 1 USB 2.0**
- **WLAN, UMTS, GPS, GSM, HSDPA, EDGE, LTE via 2 PCI Express® Mini Card slots**
- **2 Slots for IBIS, GPS, RS232, RS485, RS422**
- **24 VDC nom. (9 to 36 V) class S2 power supply, incl. ignition**
- **-40 to +70(+85)°C operating temperature**

The BC50M (formerly called BC1) is a maintenance-free box computer that has been designed for independent use or as display computer electronics for use in mobile applications, e.g. in trains, commercial vehicles, mobile machines or airplanes.

It is powered by an AMD Embedded G-Series APU (Accelerated Processing Unit), the T48N, running at 1.4 GHz. The G-Series combines low-power CPUs and advanced GPUs, in this case an AMD Radeon™ HD 6310, into a single embedded device. The use of the Embedded G-Series makes for high scalability in CPU (single/dual core) and graphics performance (various Radeon™ GPUs or none at all).

The BC50M is equipped with 2 GB of DDR3 SDRAM and offers SD card and mSATA slots. A SATA hard-disk/solid-state drive can be installed within the housing as an option. The system is designed for fanless operation at temperatures from -40 to +70°C (+85°C for up to 10 minutes), its special aluminum housing with cooling fins serves as a heatsink for the internal electronics and in this way provides conduction cooling.

The BC50M supports up to two DisplayPort® interfaces with a maximum resolution of 2560x1600 each. The DisplayPort® interfaces and all other I/O are available at the unit's front panel on standard connectors like USB, 9-pin D-Sub (HD audio and optional serial I/O), 8-pin M12 (Gigabit Ethernet) and DisplayPort®. On the inside, the system offers two PCI Express® Mini card slots with two SIM card slots. By default, one is used for each of the two PCI Express® Mini cards, but the first PCI Express® Mini card can also switch between the two SIM cards as an option. The necessary antenna connectors can be made available at the front panel.

The BC50M comes with its own integrated 30W 24 VDC nom. (9 to 36 V) class S2 wide-range power supply and is compliant with EN 50155 and prepared for e1 certification. The power can be switched on and off using an ignition signal on the power connector, and a run-down time after switching off the power can be adjusted by software.

The combination of the various CPU/GPU options with the available selection of external interfaces (realized via separate graphics and I/O interface boards within the system) makes for an extremely flexible system design that can quickly be tailored to a vast number of applications.

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Technical Data

CPU
- AMD Embedded G-Series T48N
  - 1.4 GHz processor core frequency
  - Accelerated Processing Unit (APU), also includes GPU (see Graphics)

Controller Hub
- AMD A55E

Memory
- 64 KB L1 and 512 KB L2 cache
- 2 GB DDR3 SDRAM system memory
  - Soldered
  - 1333 MT/s (667 MHz)

Mass Storage
- One SD card slot
  - Via USB
- One mSATA slot
  - Transfer rate up to 3 Gbit/s
- Serial ATA (SATA)
  - One port for hard-disk/solid-state drive mounted within the unit's housing
  - SATA Revision 3.x support
  - Transfer rates up to 600 MB/s (6 Gbit/s)

Graphics
- AMD Radeon™ HD 6310
  - Dual independent display support
  - Dual DisplayPort®
  - Maximum resolution: 2560x1600
  - Embedded in T48N APU
- 3D Graphics Acceleration
  - Full DirectX® 11 support, including full speed 32-bit floating point per component operations
  - Shader Model 5
  - OpenCL™ 1.1 support
  - OpenGL® 4.0 support
- Motion Video Acceleration
  - Dedicated hardware (UVD 3) for H.264, VC-1 and MPEG2 decoding
  - HD HQV and SD HQV support: noise removal, detail enhancement, color enhancement, cadence detection, sharpness, and advanced de-interlacing
  - Super up-conversion for SD to HD resolutions

Front I/O
- 2 DisplayPort® 1.1a interfaces
  - AUX channels and hot plug detection
  - USB channels optional
- 1 HD audio
  - HD audio codec
  - Audio stereo in
  - Audio stereo out
  - SPDIF out
  - All available via 9-pin D-Sub connector
- 2 Gigabit Ethernet
  - Via M12 connectors
- 1 USB 2.0
  - Via Series A connector
- 2 SA-Adapter™ slots for serial I/O
  - 1 UART or IBIS, GPS
  - 1 UART or CAN bus
- 6 status LEDs
  - 4 for Ethernet link and activity status
  - 2 for general board status

2 PCI Express® Mini Card slots
- For functions like WIFI, WIMAX, GSM/GPRS, UMTS
- 2 SIM card slots
- PCI Express® and USB interface

Real-Time Clock
- Buffered by Gold Cap for up to 12 h

Electrical Specifications
- Isolation voltage 1,500 VDC
  - Ethernet port 1, Ethernet port 2, audio interface, power input, USB interface
- Supply voltage:
  - 24 VDC nom. (9 to 36 V)
  - EN 50155 power interruption class S2
- Power consumption: up to 25 W

Mechanical Specifications
- Dimensions: approx. 250 mm x 220 mm x 44.1 mm
- Weight: 1.8 kg
- Front protected according to IP20

Environmental Specifications
- Temperature range (operation):
  - -40°C to 70°C (screened), with up to 85°C for 10 minutes according to class Tx (EN 50155)
  - Fanless operation
- Temperature range (storage): -40..+85°C
- Relative humidity (operation): max. 95% non-condensing
- Relative humidity (storage): max. 95% non-condensing
- Altitude: -300 m to +3,000 m
- Shock: 50 m/s², 30 ms
- Vibration (function): 1 m/s², 5 Hz - 150 Hz
- Vibration (lifetime): 7.9 m/s², 5 Hz - 150 Hz
- Conformal coating of internal components on request

Technical Data

MTBF
- 262,804 h @ 40°C according to IEC/TR 62380 (RDF 2000)

Safety
- PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers

EMC
- Conforming to EN 55022 (radio disturbance), IEC 61000-4-2 (ESD) and IEC 61000-4-4 (burst)
- Prepared for certification according to e1 requirements of the German Federal Motor Transport Authority

BIOS
- InsydeH2O™ UEFI Framework

Software Support
- Windows® 7
- Windows® Embedded Standard 7
- Windows® XP Embedded
- Linux
- For more information on supported operating system versions and drivers see Software.

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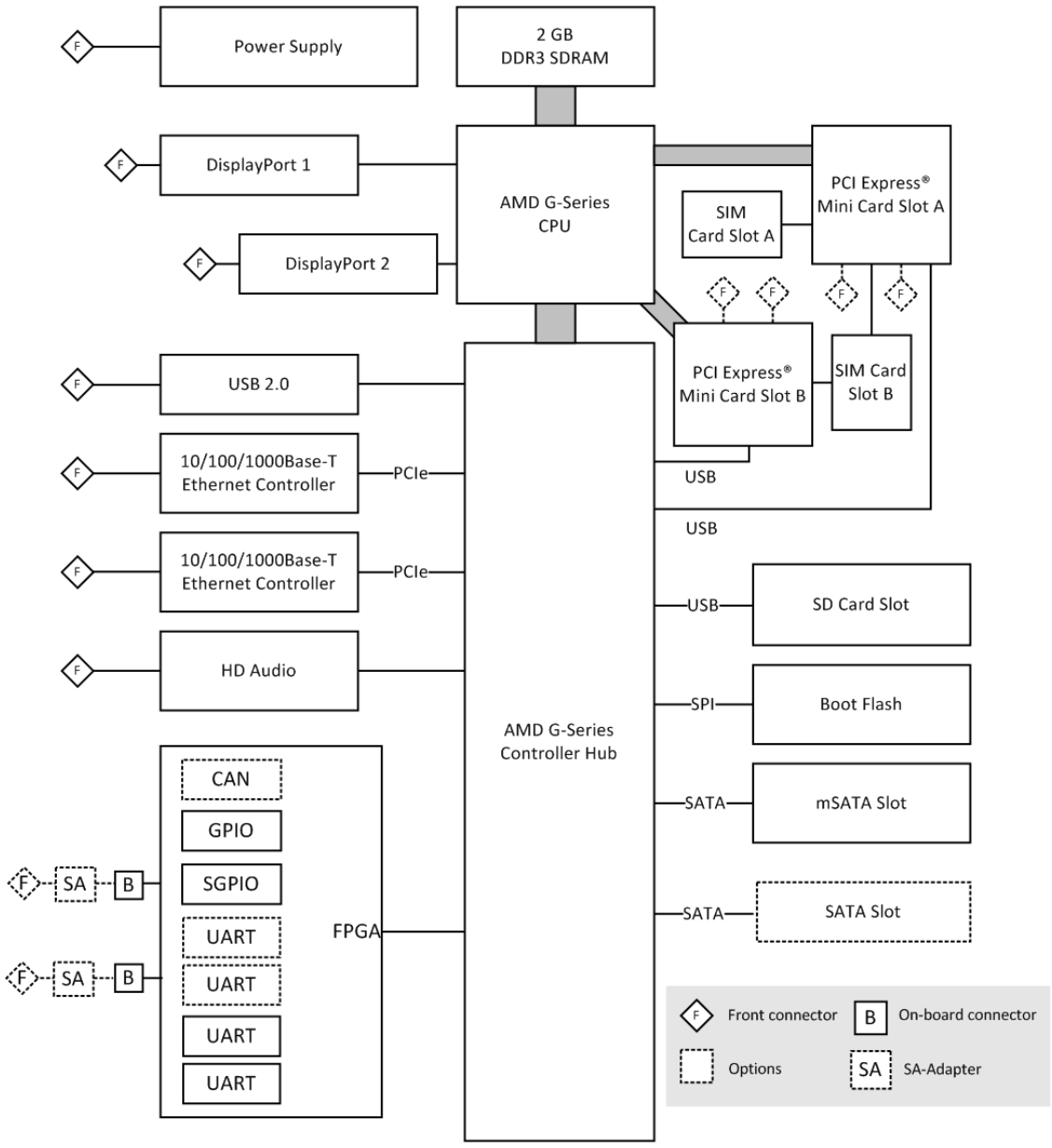
Diagram



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Configuration & Options

Standard Configurations

Article No.	APU	Graphics	Memory	Input Voltage	HD Audio	Antenna Connectors	SATA HDD/SSD
09BC50M00	AMD T48N, 1.4 GHz Dual Core (18W)	AMD Radeon™ HD 6310	2 GB DDR3-1066, 64KB L1 cache, 512kB L2 cache	24 VDC nom.	Yes	No	No

Options

APU

- AMD T56N, 1.65 GHz Dual Core, 18W, AMD Radeon™ HD 6320
- AMD T52R, 1.5 GHz Single Core, 18W, AMD Radeon™ HD 6310
- AMD T48N, 1.4 GHz Dual Core, 18W, AMD Radeon™ HD 6310
- AMD T40N, 1.0 GHz Dual Core, 9W, AMD Radeon™ HD 6290
- AMD T44R, 1.2 GHz Single Core, 9W, AMD Radeon™ HD 6250
- AMD T40E, 1.0 GHz Dual Core, 6.4W, AMD Radeon™ HD 6250
- AMD T40R, 1.0 GHz Single Core, 5.5W, AMD Radeon™ HD 6250
- AMD T16R, 615 MHz Single Core, 4.5W, AMD Radeon™ HD 6250

Memory

- Up to 4 GB DDR3 SDRAM system memory
- SATA hard-disk/solid state drive (mounted within housing)

Graphics

- Maximum resolution depending on GPU
  - 2560x1600 (all DisplayPort® interfaces) with Radeon™ HD 6310 and 6320
  - 1920x1200 (all DisplayPort® interfaces) with Radeon™ HD 6250 and 6290

I/O

- Antenna connectors
  - For functions like WIFI, WIMAX, GSM/GPRS, UMTS in combination with PCI Express® Mini Card(s)
  - Reverse SMA connector
- SA-Adapter™
  - Binary I/O using SA15 also possible (depending on functions implemented as FPGA IP cores)

Electrical Specifications

- Input voltage 36 VDC nom.

Environmental Specifications

- Temperature range (operation):
  - -40°C to 85°C (screened) with wider housing with additional cooling fins

As the product concept is very flexible, there are many other configuration possibilities. Please contact our sales team if you do not find your required function in the options. Please note that some of these options may only be available for large volumes.

Ordering Information

Standard BC50M Models

09BC50M00 Box computer with dual graphics connection, 24 VDC PSU, AMD T48N, 1.4 GHz, 2 GB RAM, SD card slot, mSATA slot, 2x DisplayPort®, 2x Gb Ethernet, 1x USB, 2x SA-Adapter™ slot (UARTs, fieldbuses), 2x PCI Express® Mini card slot, 2x SIM card slot, -40..+70(+85)°C screened, IP40, EN 50155, prepared for e1

Related Hardware

08AE63-00 AE63, DisplayPort® to LVDS converter, temperature sensor, ambient light, touch input, key control, input voltage 12V..24V, -40°..+85°C screened

Memory

0751-0047 SD card, 4GB, -40..+85°C

0751-0051 SSD mSATA, 8 GB, -40..+85°C

SA-Adapters

You can find a more detailed overview of possible carrier board/SA-Adapter™ combinations along with software support in our option matrix (PDF).

08SA01-06 RS232, not optically isolated, -40..+85°C screened

08SA02-07 RS422/485, full duplex, optically isolated, -40..+85°C screened

08SA03-01 RS232, optically isolated, -40..+85°C screened

08SA08-01 CAN ISO high-speed, optically isolated, -40..+85°C screened

08SA15-00 8 binary I/O channels, -40..+85°C with qualified components, no RoHS

08SA22-00 IBIS master SA-Adapter™, -40..+85°C screened

08SA22-01 IBIS slave SA-Adapter™, -40..+85°C screened

Miscellaneous Accessories

05BC00-00 Starter Kit for BoxPC: AC/DC power supply, DisplayPort® to DVI adapter (active), M12 to RJ45 Gbit Ethernet cable, HF cable with U.FL plug to RP-SMA plug

05BC01-00 Mechanics kit for BoxPC: 19" mounting kit, heat sinks for horizontal and vertical mounting

0780-0005 DisplayPort® to DVI-D adapter, 20 cm

Software: Linux

This product is designed to work under Linux. See below for potentially available separate software packages from MEN.

13SC24-90 Linux I2C controller driver (MEN) for SC24, AE51 and BC50M

13Z015-06 MDIS5™ low-level driver sources (MEN) for 16Z029_CAN (MSCAN/Layer2)

13Z016-06 MDIS5™ driver (MEN) for 16Z029_CAN (CANopen master)

13Z017-06 MDIS5™ low-level driver sources (MEN) for 16Z034_GPIO and 16Z037_GPIO

Software: Windows

This product is designed to work under Windows®. See below for potentially available separate software packages from MEN.

10F014-78 Windows® XP Embedded BSP (MEN) for F11S, F14, F15, F17, F18, F19P, F21P, G20, XM1, XM1L, XM2, MM1, MM2, SC21, SC24, DC1, DC2, RC1 and BC50M

10Y000-78 Windows® Embedded Standard 7 BSP for F11S, F19P, F21P, G20, XM1L, XM2, MM1, MM2, SC21, SC24, BC50M, F206, F210, F215, F216, G215, P506, P507 and P511

13T010-70 Windows® 32-bit network driver (Intel®) for XM1, XM1L, XM2, MM2, F11S, F18, F18E, F19P, F21P, G20, GM1, GM2, G211, G211F, SC24 and BC50M

13T020-70 Windows® 64-bit network driver (Intel®) for F18, F18E, F19P, F21P, G20, GM1, GM2, G211, G211F, XM2, SC24 and BC50M

13T025-70 Windows® XP GPU and chipset driver (AMD) for BC50M and SC24

13T026-70 Windows® Vista™ / Windows® 7 GPU and chipset driver (AMD) for BC50M, SC24 and G214

13Z015-70 MDIS4™/2004/MDIS5™ Windows® driver (MEN) for 16Z029_CAN (MSCAN/Layer2)

13Z016-70 MDIS5™ Windows® driver (MEN) for 16Z029_CAN (CANopen master)

13Z017-70 MDIS4™/2004 / MDIS5™ Windows® driver (MEN) for 16Z034_GPIO devices

For operating systems not mentioned here contact MEN sales.

Documentation

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Ordering Information

20BC01-00	BC50M User Manual
20BC50MER	BC50M Errata
21APPN015	Application Note: Using Real-Time Operating Systems on MEN CPUs with InsydeH2O™ UEFI BIOS

For the most up-to-date ordering information and direct links to other data sheets and downloads, see the BC50M online data sheet under » www.men.de.

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